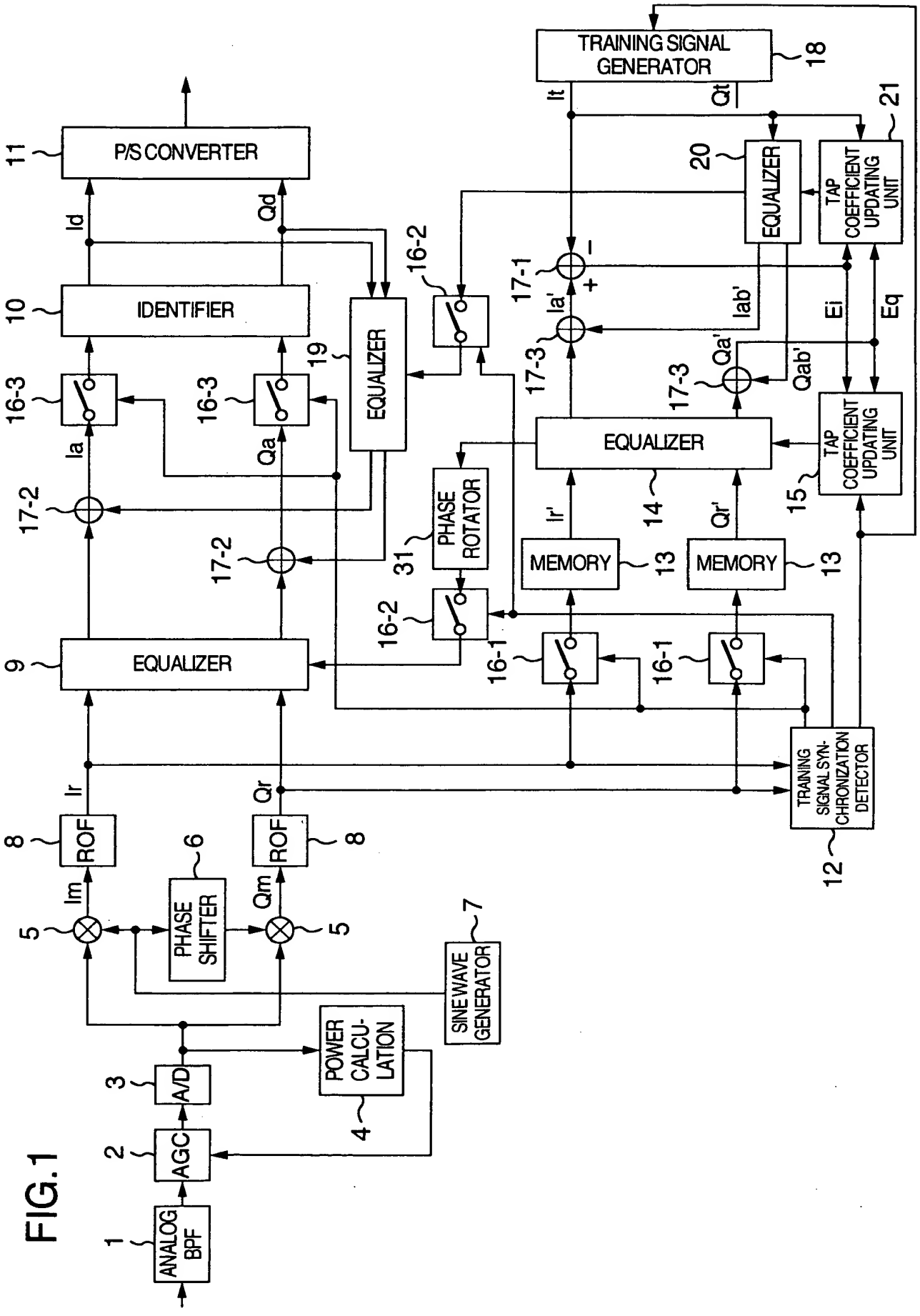

ANALOG BPF
1
AGC
2
A/D
3
POWER CALCU-LATION
4
SINE WAVE GENERATOR
7
PHASE SHIFTER
6
5
5
ROF
8
ROF
8
Ir
Qr
Im
Qm
EQUALIZER
9
IDENTIFIER
10
P/S CONVERTER
11
TRAINING SIGNAL SYN-CHRONIZATION DETECTOR
12
MEMORY
13
MEMORY
13
EQUALIZER
14
TAP COEFFICIENT UPDATING UNIT
15
PHASE ROTATOR
31
EQUALIZER
19
EQUALIZER
20
TAP COEFFICIENT UPDATING UNIT
21
TRAINING SIGNAL GENERATOR
18
Id
Qd
Ia
Qa
Ir'
Qr'
It
Qt
Ia'
Iab'
Qa'
Qab'
Ei
Eq
16-1
16-2
16-3
17-1
17-2
17-3

FIG.1

FIG.2

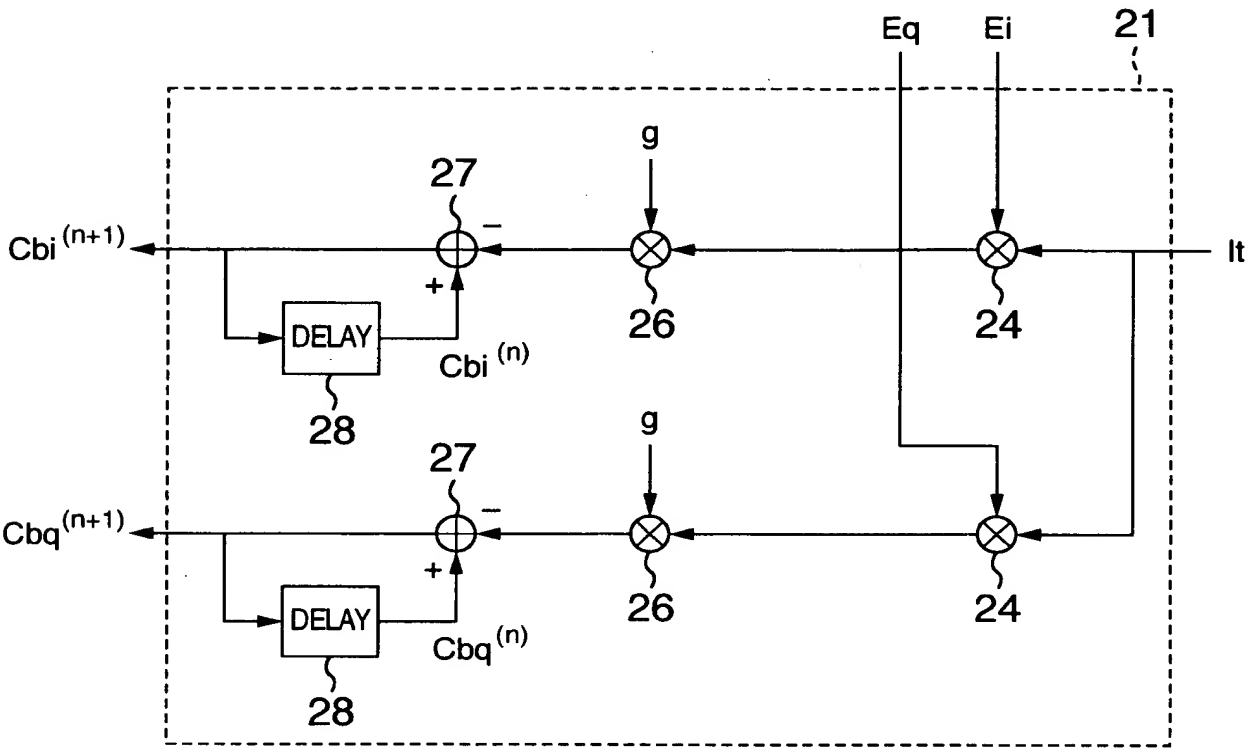

Eq
Ei
21
g
27
Cbi (n+1)
It
DELAY
Cbi (n)
26
24
28
g
27
Cbq (n+1)
DELAY
Cbq (n)
26
24
28

FIG.3

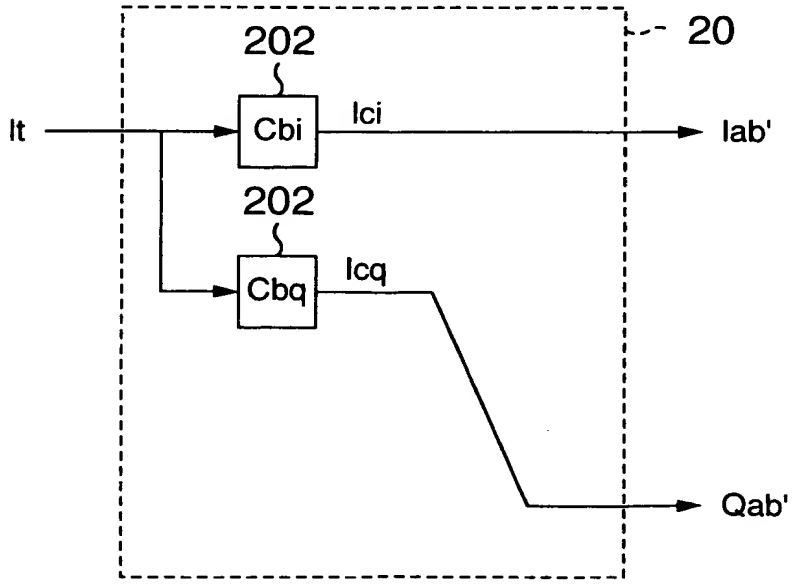

20
202
It
Cbi
Ici
Iab'
202
Cbq
Icq
Qab'

FIG.4

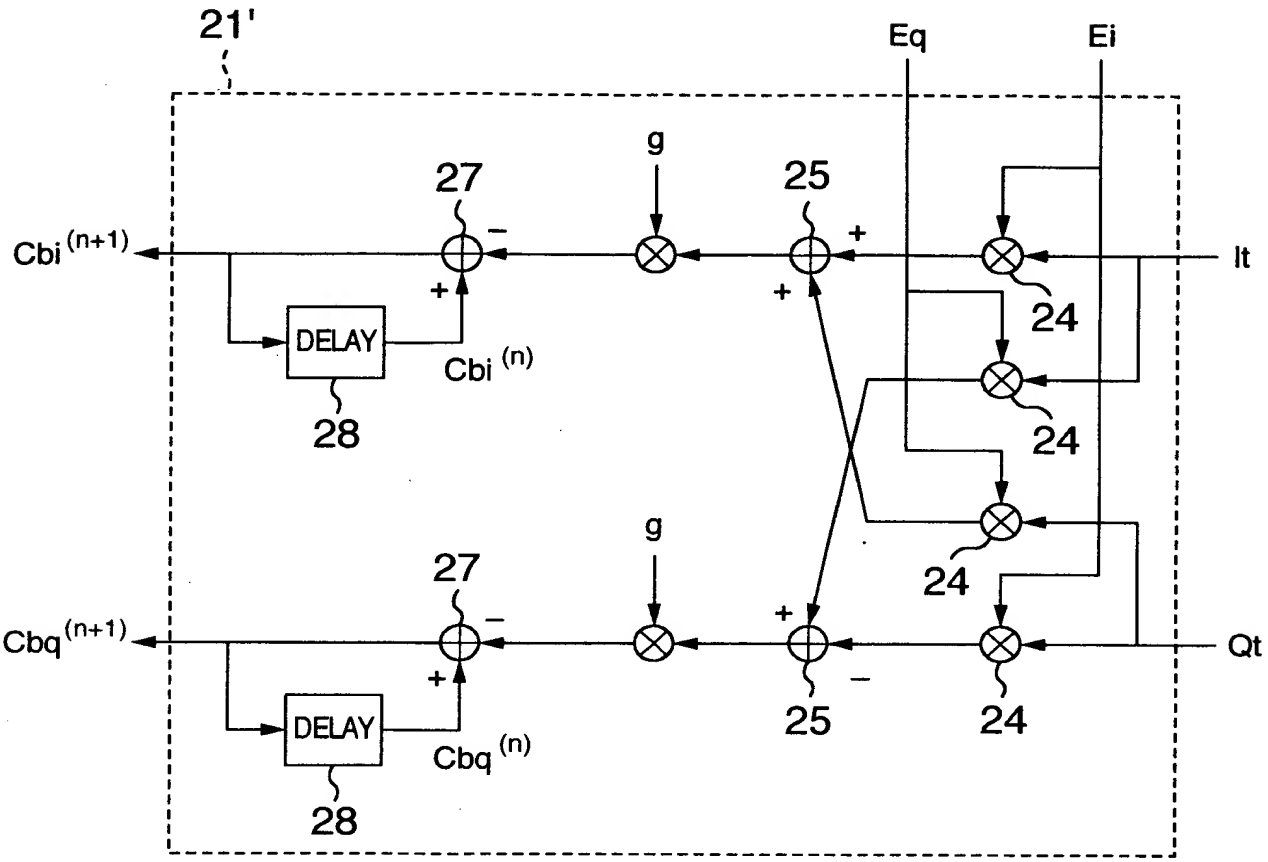

21'
Eq
Ei
g
27
25
Cbi (n+1)
It
DELAY
Cbi (n)
28
24
24
g
27
25
Cbq (n+1)
Qt
DELAY
Cbq (n)
28
24

FIG.5

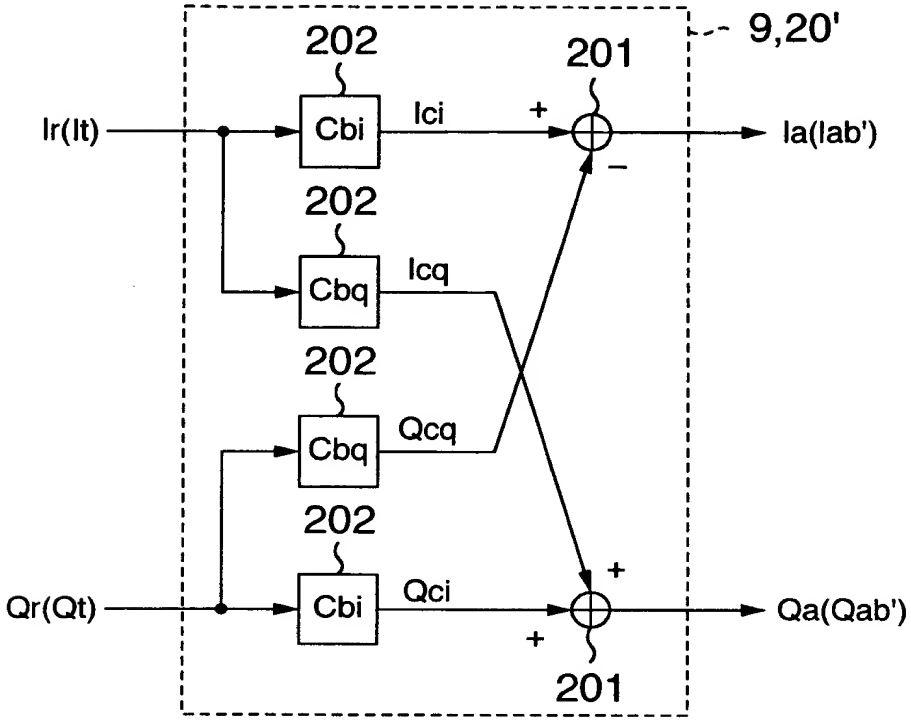

9,20'
202
201
Ir(It)
Cbi
Ici
+
Ia(Iab')
−
202
Cbq
Icq
202
Cbq
Qcq
202
Cbi
Qci
+
Qr(Qt)
Qa(Qab')
+
201

FIG.6

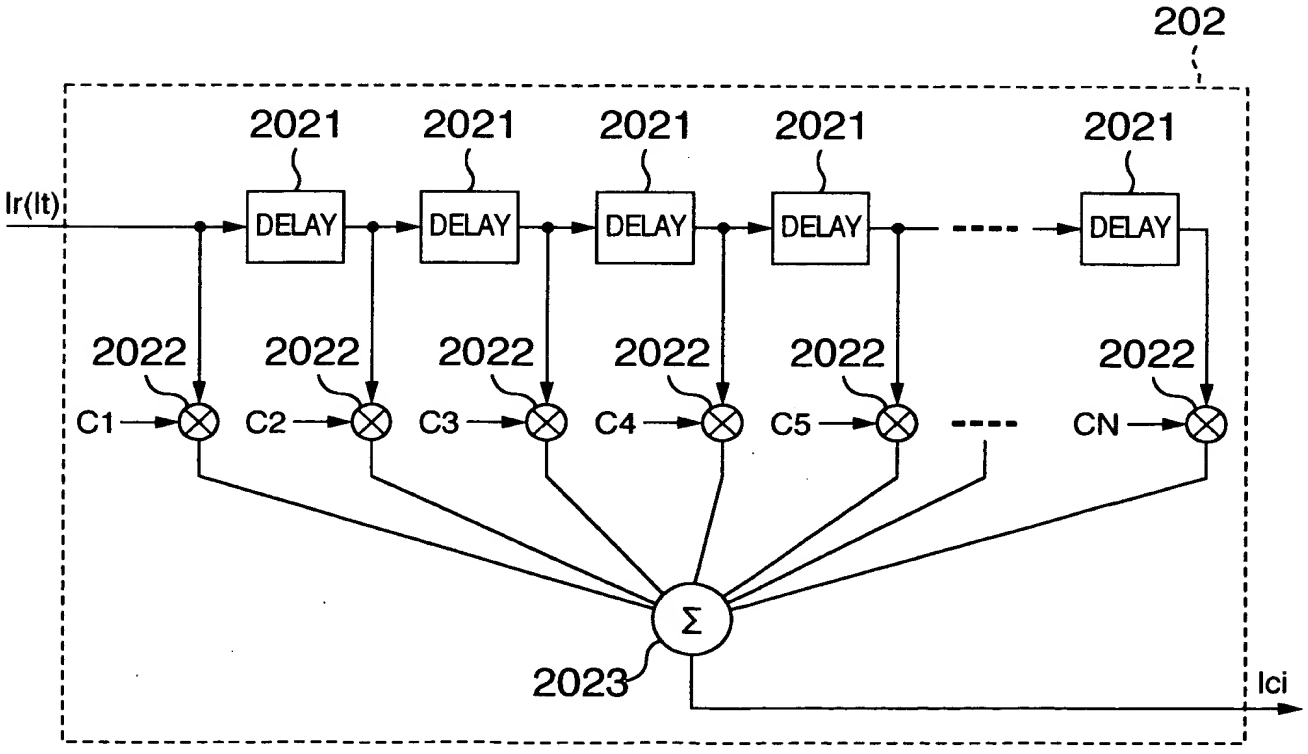

202
2021
2021
2021
2021
2021
Ir(It)
DELAY
DELAY
DELAY
DELAY
DELAY
2022
2022
2022
2022
2022
2022
C1
C2
C3
C4
C5
CN
Σ
2023
Ici

FIG.7

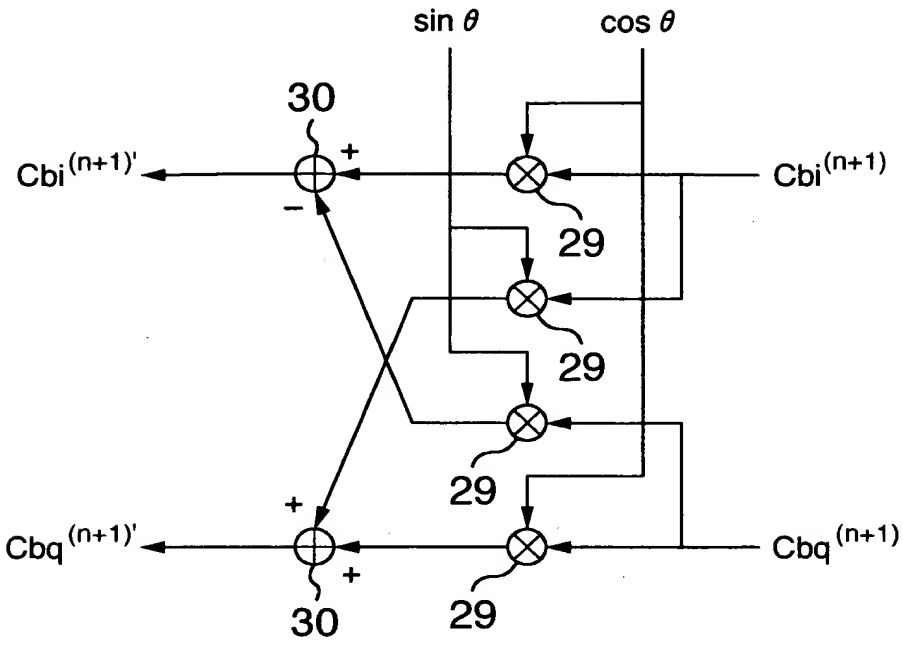
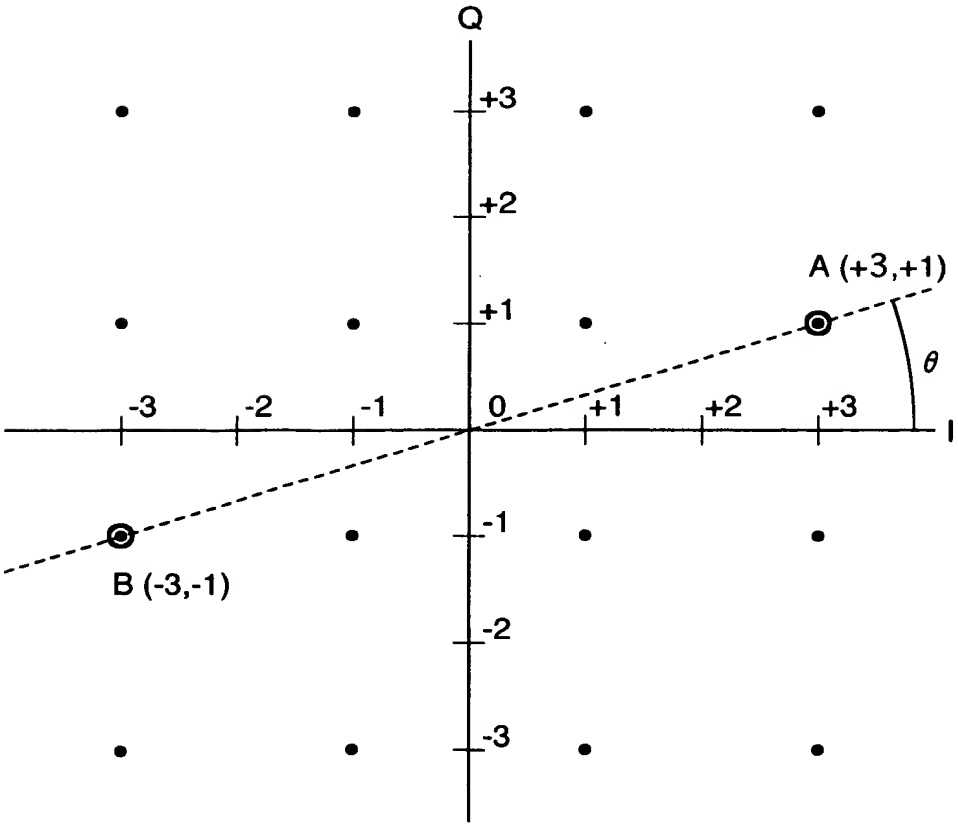
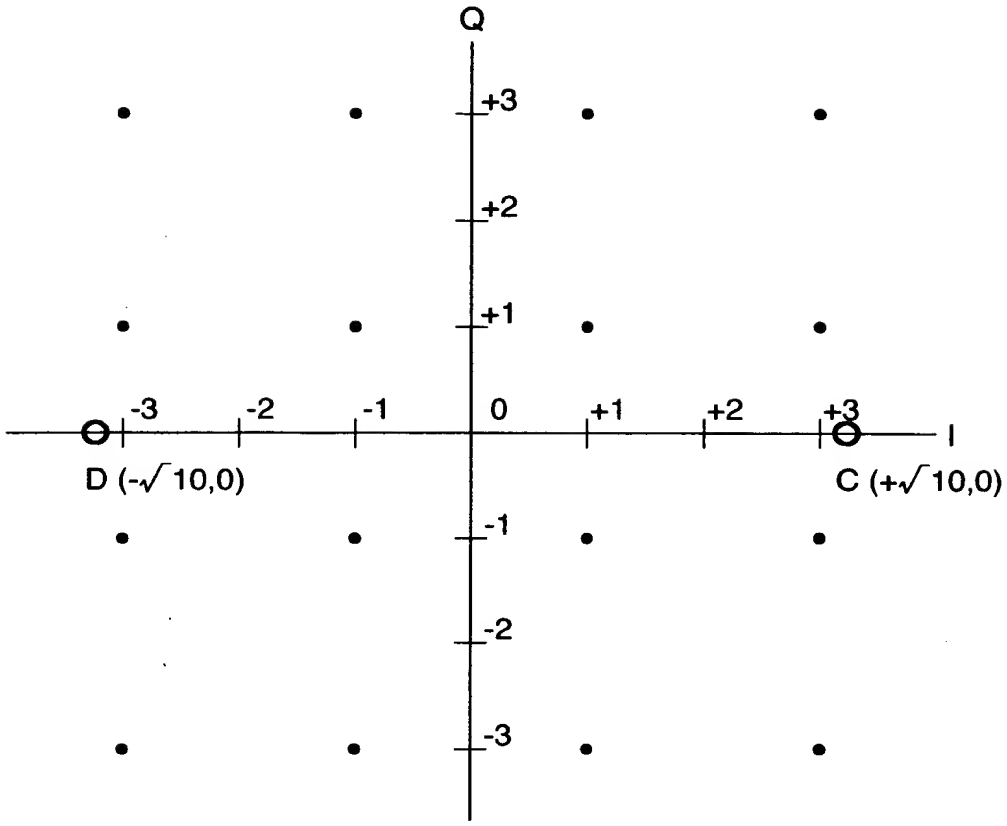


FIG.8



◎ SIGNAL POINT OF TRAINING SIGNAL

FIG.9



O SIGNAL POINT OF TRAINING SIGNAL

FIG.10

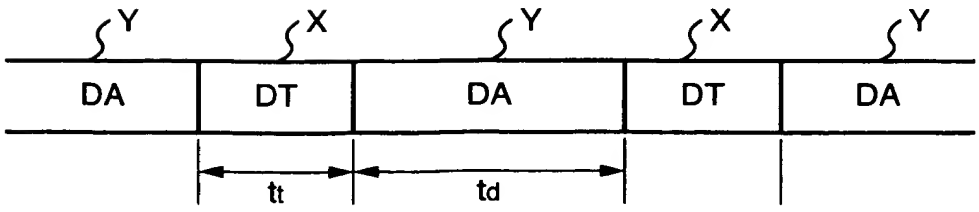
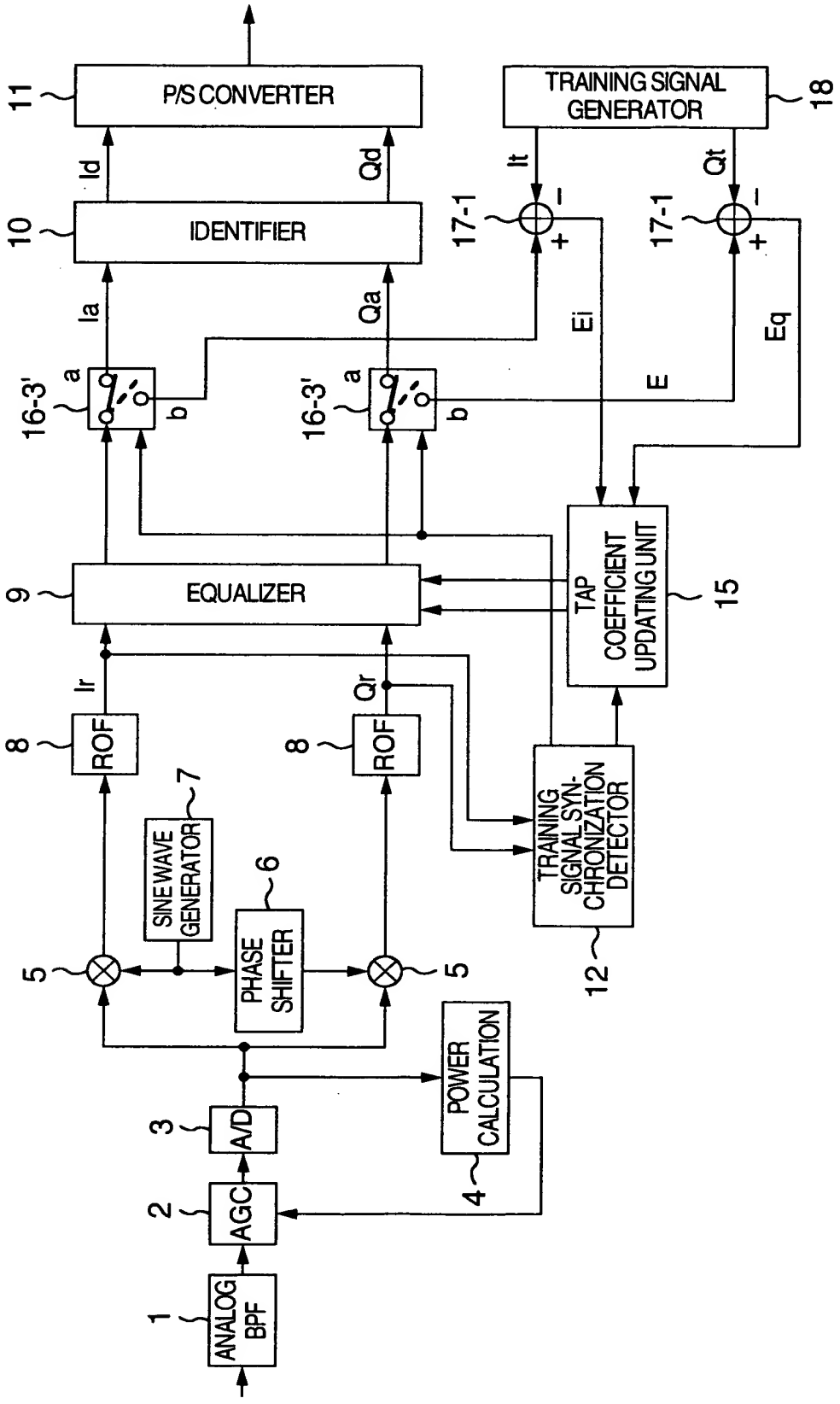
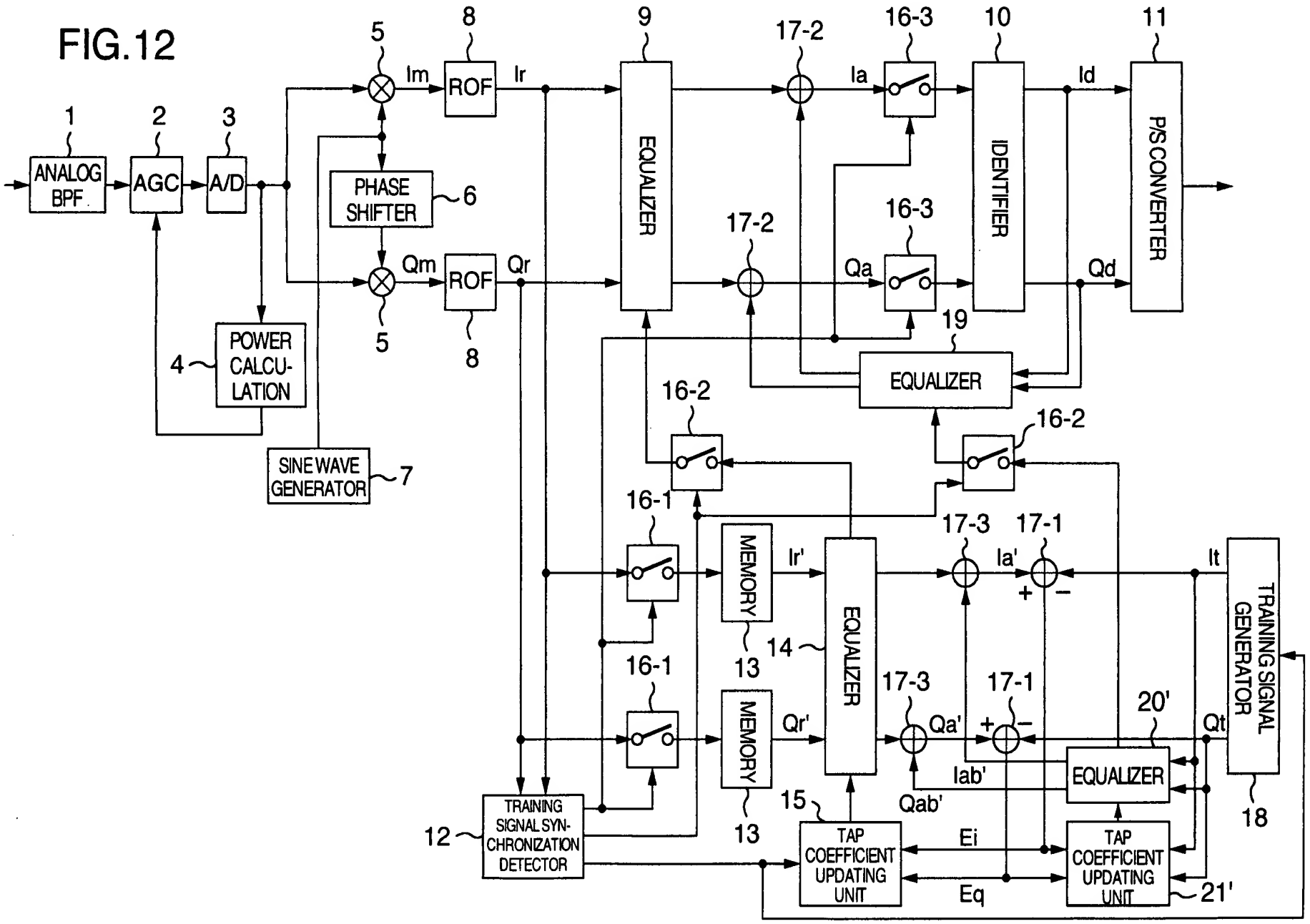


FIG.11
PRIOR ART



EP 0 622 930 B1

FIG.12



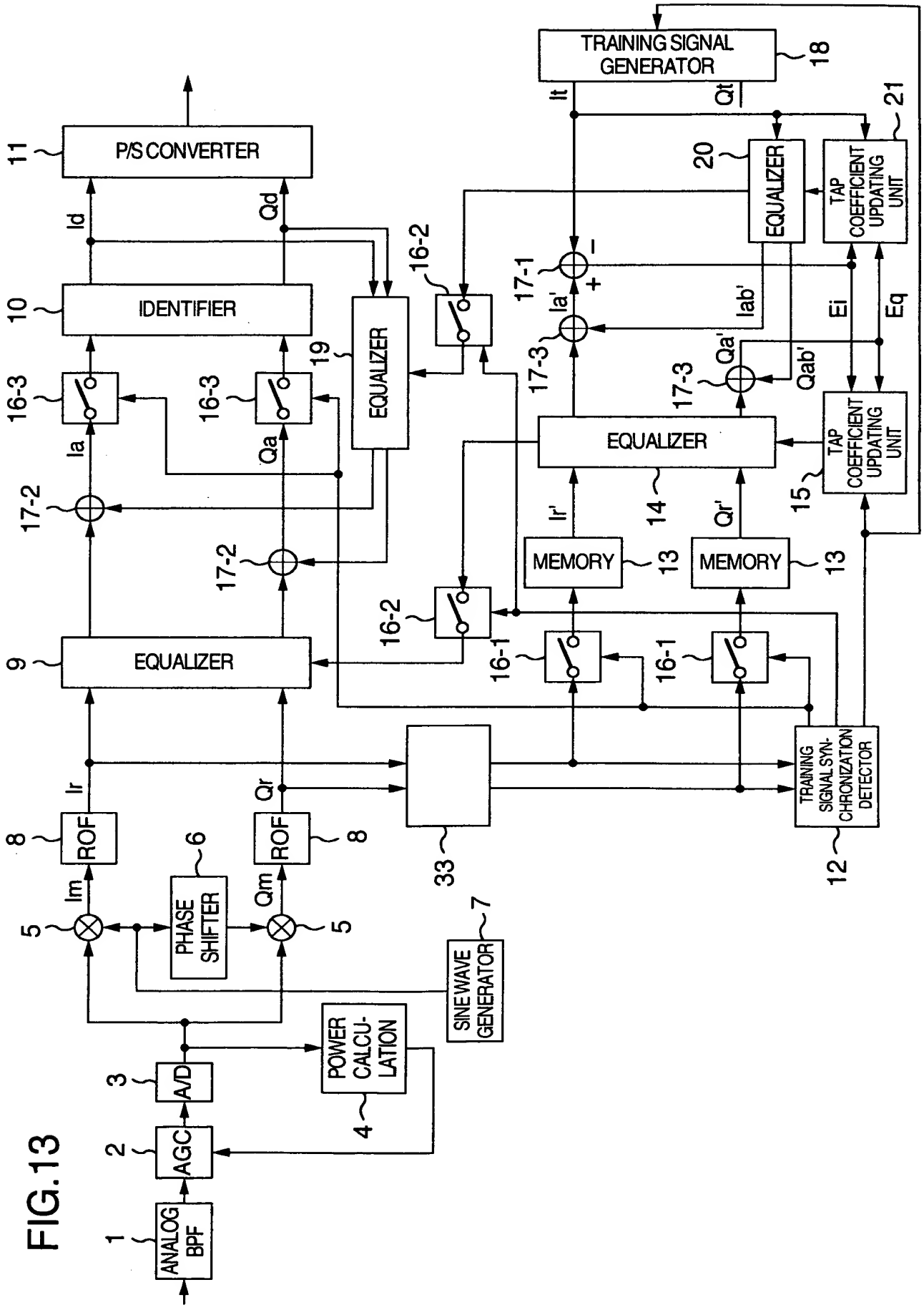

TRAINING SIGNAL GENERATOR
18
It
Qt
21
20
EQUALIZER
TAP COEFFICIENT UPDATING UNIT
11
P/S CONVERTER
Id
Qd
16-2
17-1
Ia'
Iab'
Ei
Eq
10
IDENTIFIER
16-3
16-3
19
EQUALIZER
17-3
Qa'
Qab'
17-3
Ia
Qa
17-2
EQUALIZER
TAP COEFFICIENT UPDATING UNIT
14
15
Ir'
Qr'
17-2
MEMORY
13
MEMORY
13
16-2
16-1
16-1
9
EQUALIZER
Ir
Qr
TRAINING SIGNAL SYN-CHRONIZATION DETECTOR
33
12
8
ROF
8
ROF
Im
Qm
6
PHASE SHIFTER
5
5
7
SINE WAVE GENERATOR
POWER CALCU-LATION
4
3
A/D
2
AGC
1
ANALOG BPF

FIG.13

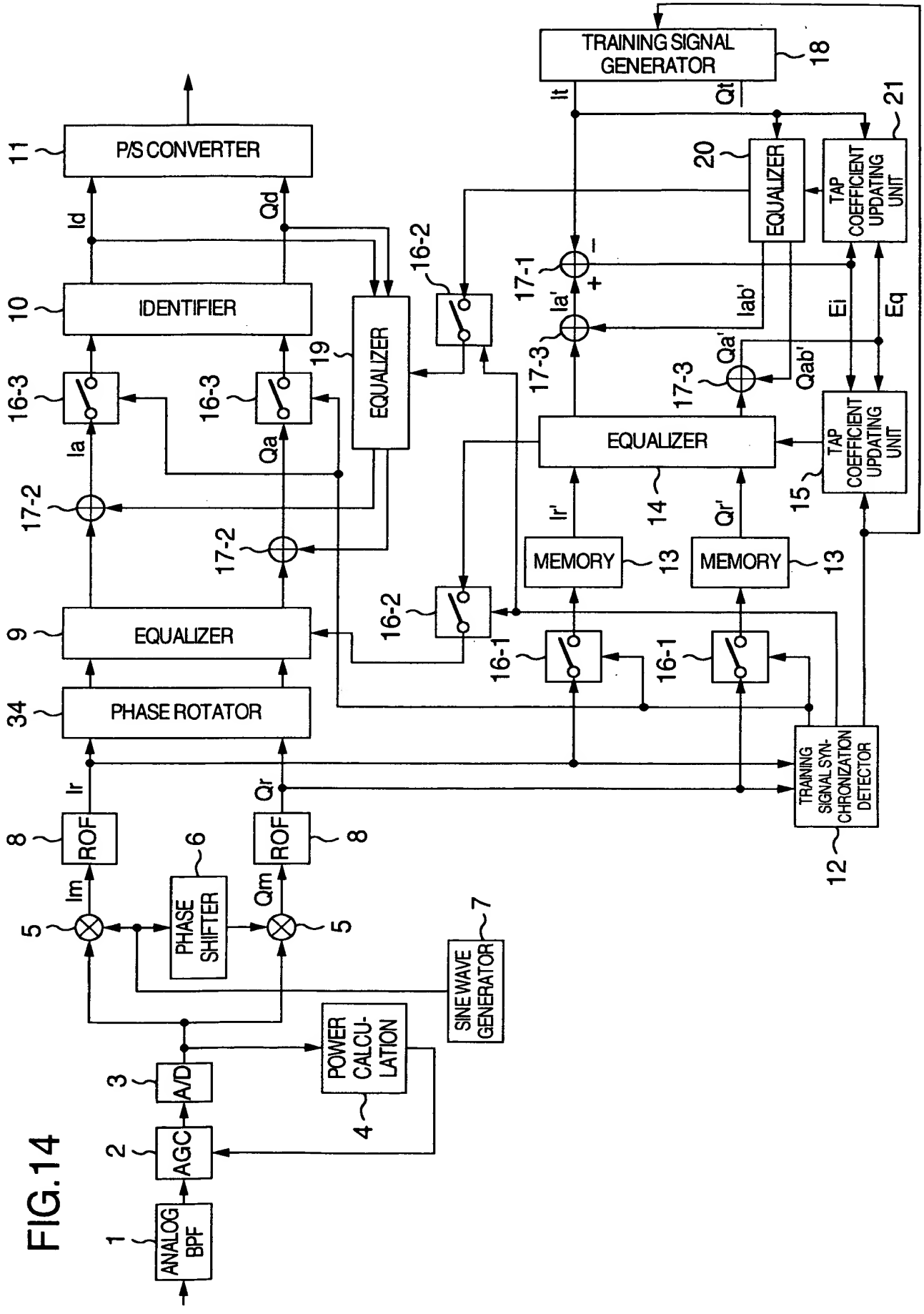

TRAINING SIGNAL GENERATOR
18
It
Qt
21
20
EQUALIZER
TAP COEFFICIENT UPDATING UNIT
11
P/S CONVERTER
Id
Qd
16-2
17-1
Ia'
Iab'
Ei
Eq
10
IDENTIFIER
19
EQUALIZER
16-3
16-3
17-3
Qa'
Qab'
17-3
Ia
Qa
EQUALIZER
TAP COEFFICIENT UPDATING UNIT
17-2
17-2
Ir'
Qr'
14
15
MEMORY
13
MEMORY
13
16-2
9
EQUALIZER
16-1
16-1
34
PHASE ROTATOR
Ir
Qr
TRAINING SIGNAL SYN-CHRONIZATION DETECTOR
8
ROF
8
ROF
6
Im
Qm
PHASE SHIFTER
5
5
7
SINE WAVE GENERATOR
POWER CALCU-LATION
4
3
A/D
2
AGC
1
ANALOG BPF

FIG.14

FIG.15

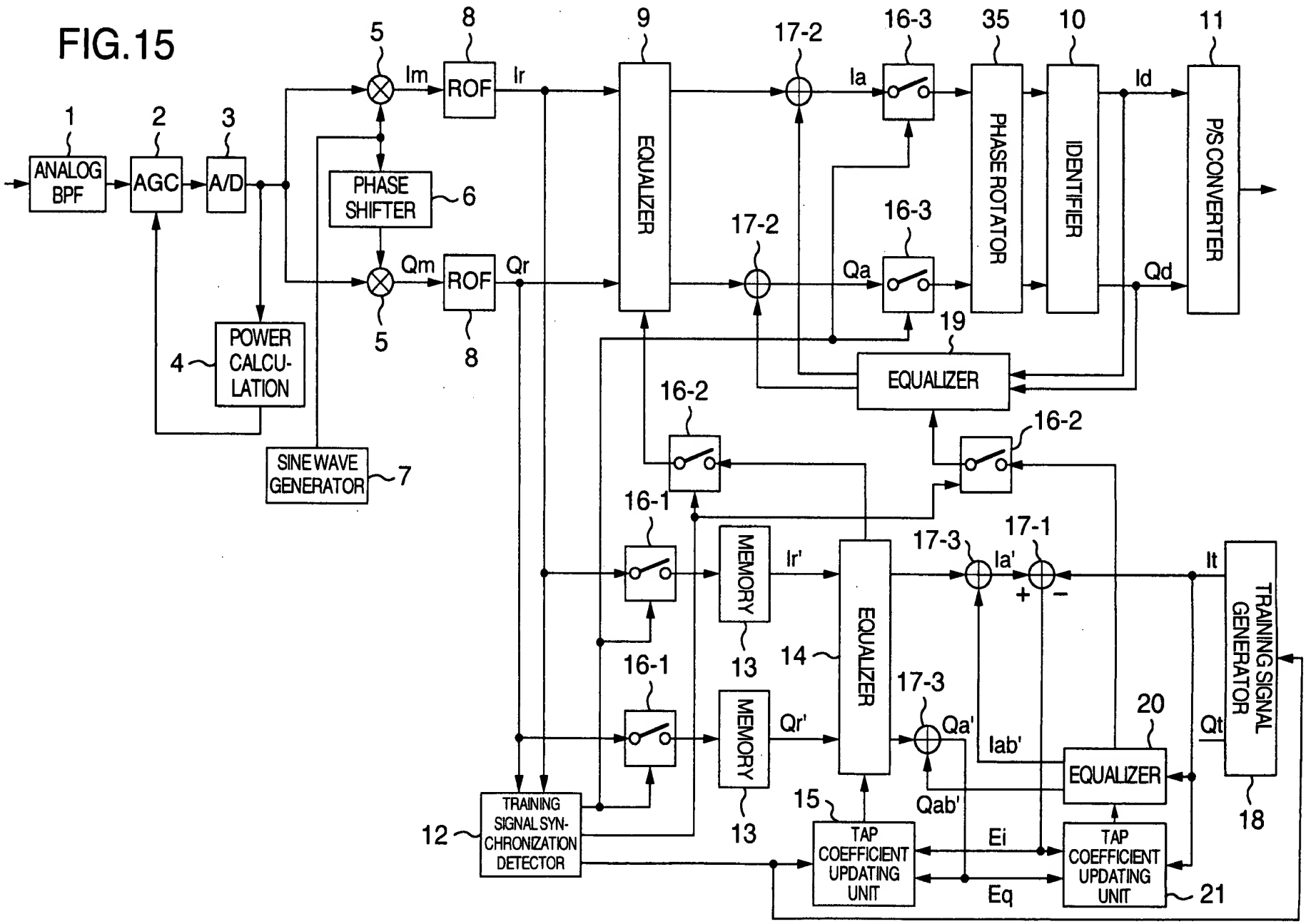
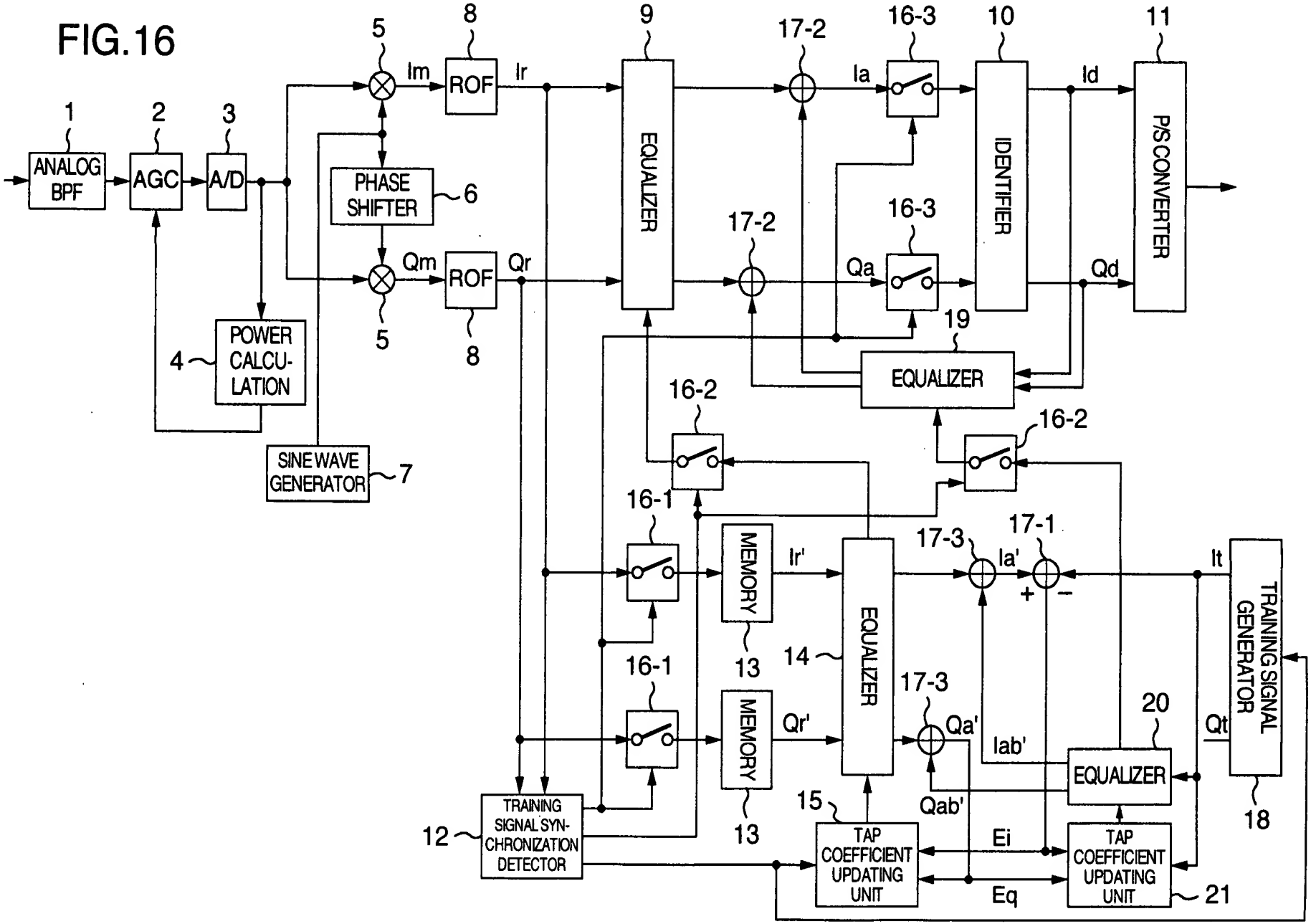

1
ANALOG BPF
2
AGC
3
A/D
4
POWER CALCU-LATION
5
Im
5
Qm
6
PHASE SHIFTER
7
SINE WAVE GENERATOR
8
ROF
Ir
8
ROF
Qr
9
EQUALIZER
17-2
17-2
16-3
Ia
16-3
Qa
35
PHASE ROTATOR
10
IDENTIFIER
11
P/S CONVERTER
Id
Qd
19
EQUALIZER
16-2
16-2
16-1
16-1
MEMORY
13
MEMORY
13
Ir'
Qr'
14
EQUALIZER
17-3
Ia'
17-1
+
−
17-3
Qa'
Iab'
Qab'
20
EQUALIZER
It
Qt
TRAINING SIGNAL GENERATOR
18
12
TRAINING SIGNAL SYN-CHRONIZATION DETECTOR
15
TAP COEFFICIENT UPDATING UNIT
Ei
Eq
TAP COEFFICIENT UPDATING UNIT
21

FIG.16


1
2
3
ANALOG BPF
AGC
A/D
4
POWER CALCU-LATION
5
Im
8
ROF
Ir
PHASE SHIFTER
6
Qm
ROF
Qr
5
8
SINE WAVE GENERATOR
7
9
EQUALIZER
17-2
16-3
Ia
10
IDENTIFIER
Id
11
P/S CONVERTER
17-2
16-3
Qa
Qd
19
EQUALIZER
16-2
16-2
16-1
16-1
MEMORY
Ir'
13
14
EQUALIZER
17-3
Ia'
17-1
+
−
It
TRAINING SIGNAL GENERATOR
18
MEMORY
Qr'
13
17-3
Qa'
20
Qt
Iab'
EQUALIZER
12
TRAINING SIGNAL SYN-CHRONIZATION DETECTOR
15
TAP COEFFICIENT UPDATING UNIT
Ei
Eq
TAP COEFFICIENT UPDATING UNIT
21
Qab'

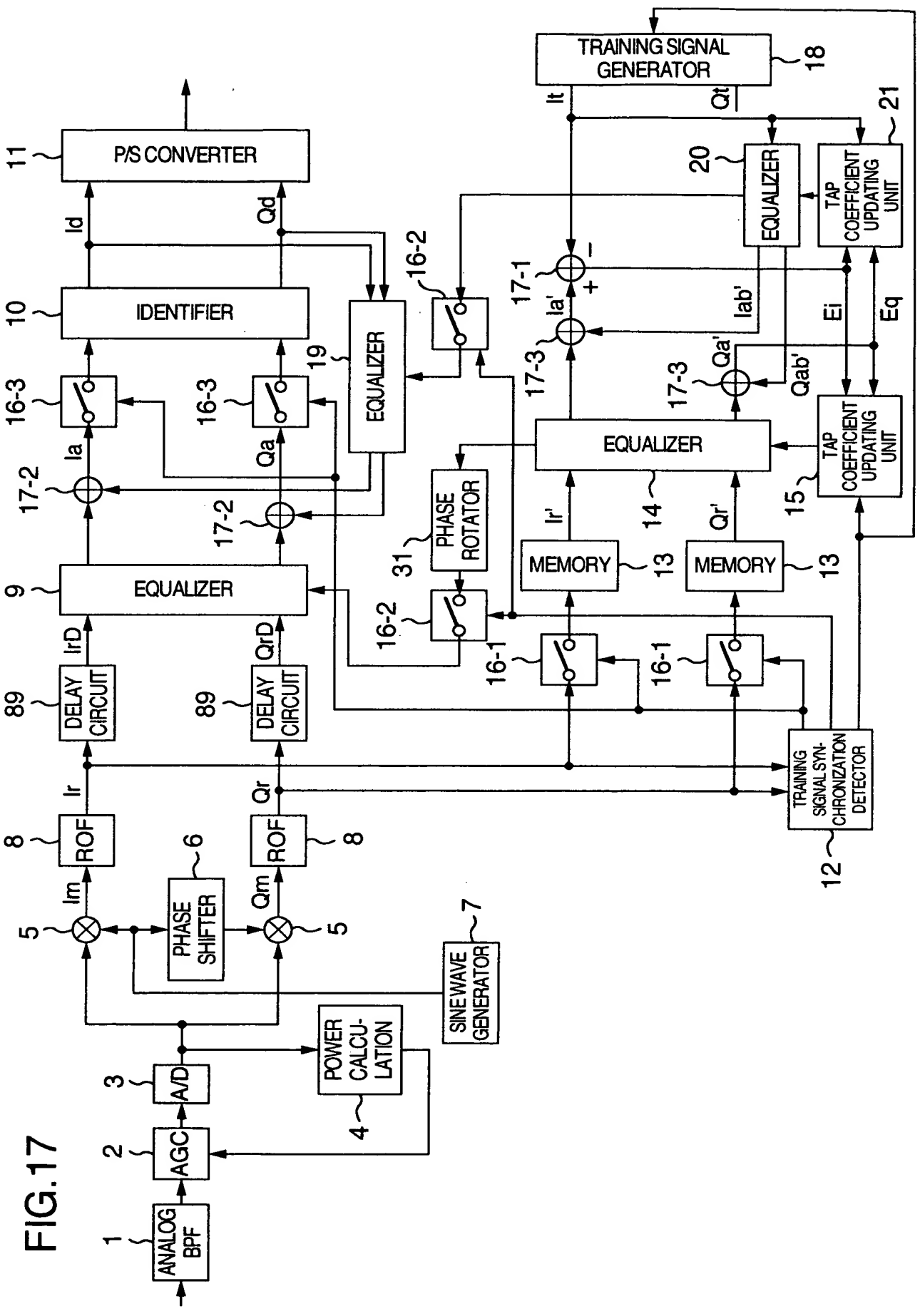
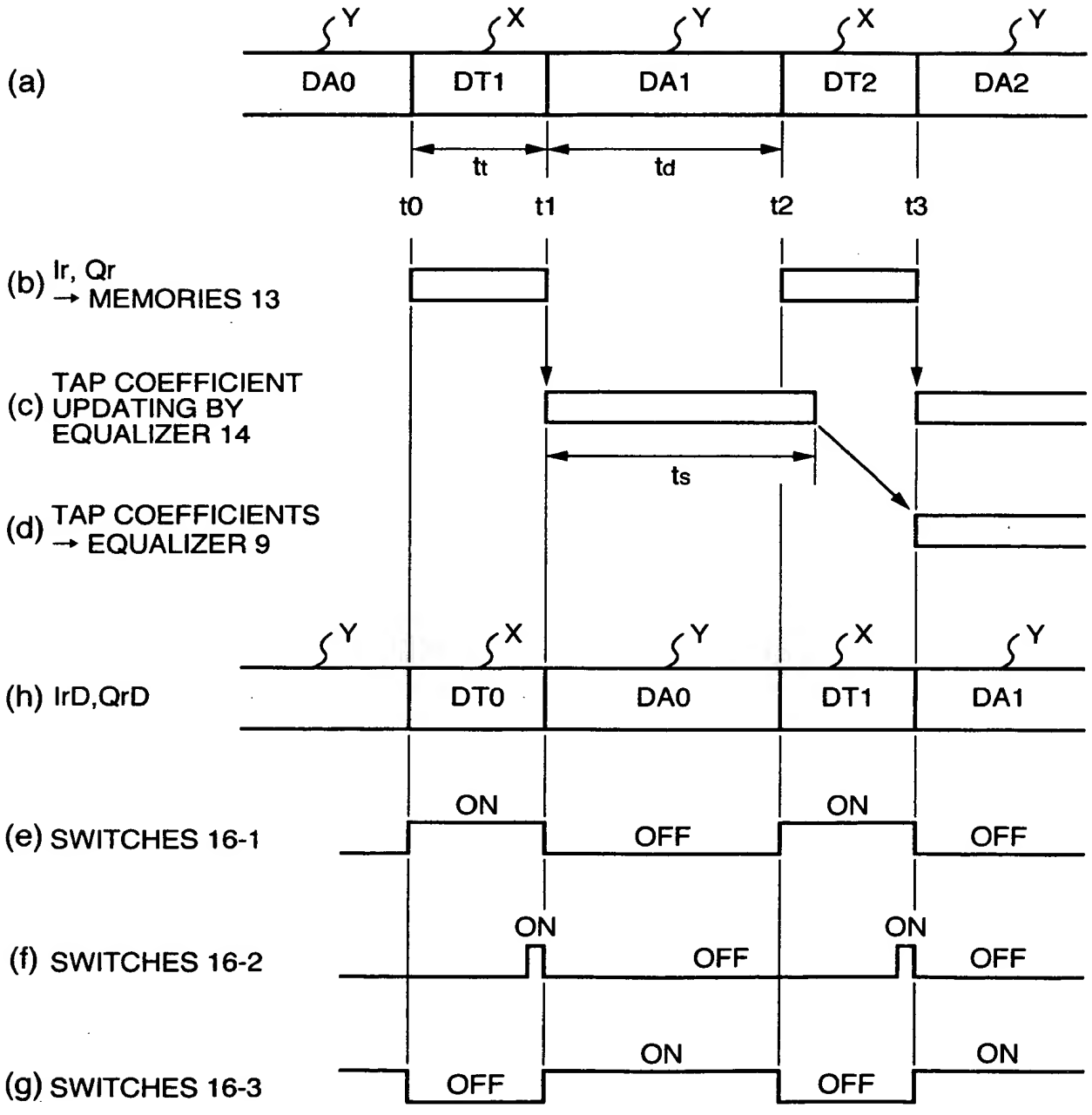

ANALOG BPF
1
AGC
2
A/D
3
POWER CALCU-LATION
4
SINE WAVE GENERATOR
7
PHASE SHIFTER
6
ROF
8
ROF
8
Im
Qm
5
5
Ir
Qr
DELAY CIRCUIT
89
DELAY CIRCUIT
89
IrD
QrD
EQUALIZER
9
IDENTIFIER
10
P/S CONVERTER
11
Id
Qd
16-3
16-3
Ia
Qa
17-2
17-2
EQUALIZER
19
16-2
PHASE ROTATOR
31
16-2
16-1
16-1
MEMORY
13
MEMORY
13
Ir'
Qr'
EQUALIZER
14
TAP COEFFICIENT UPDATING UNIT
15
TRAINING SIGNAL SYN-CHRONIZATION DETECTOR
12
TRAINING SIGNAL GENERATOR
18
It
Qt
EQUALIZER
20
TAP COEFFICIENT UPDATING UNIT
21
17-1
Ia'
Iab'
17-3
Qa'
Qab'
17-3
Ei
Eq

FIG.17

FIG.18


(a)
Y
X
Y
X
Y
DA0
DT1
DA1
DT2
DA2
tt
td
t0
t1
t2
t3
(b) Ir, Qr → MEMORIES 13
(c) TAP COEFFICIENT UPDATING BY EQUALIZER 14
ts
(d) TAP COEFFICIENTS → EQUALIZER 9
(h) IrD,QrD
DT0
DA0
DT1
DA1
(e) SWITCHES 16-1
ON
OFF
(f) SWITCHES 16-2
(g) SWITCHES 16-3

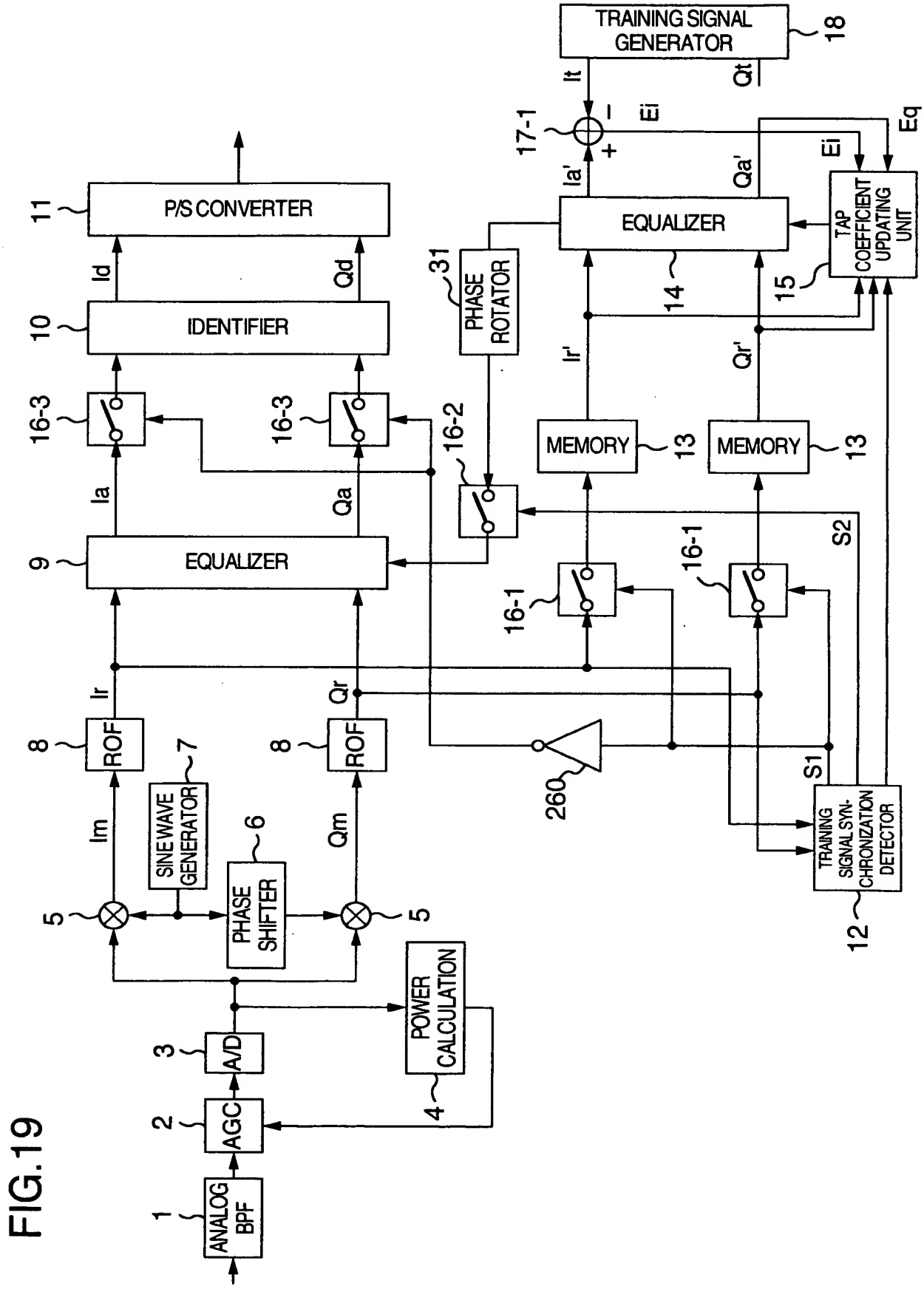

TRAINING SIGNAL GENERATOR
18
It
Qt
17-1
Ei
Eq
Ia'
Qa'
EQUALIZER
TAP COEFFICIENT UPDATING UNIT
14
15
P/S CONVERTER
11
Id
Qd
IDENTIFIER
10
PHASE ROTATOR
31
Ir'
Qr'
MEMORY
13
16-3
16-2
16-1
Ia
Qa
EQUALIZER
9
S2
S1
260
ROF
8
Ir
Qr
SINE WAVE GENERATOR
7
PHASE SHIFTER
6
Im
Qm
5
TRAINING SIGNAL SYN-CHRONIZATION DETECTOR
12
POWER CALCULATION
4
A/D
3
AGC
2
ANALOG BPF
1

FIG.19

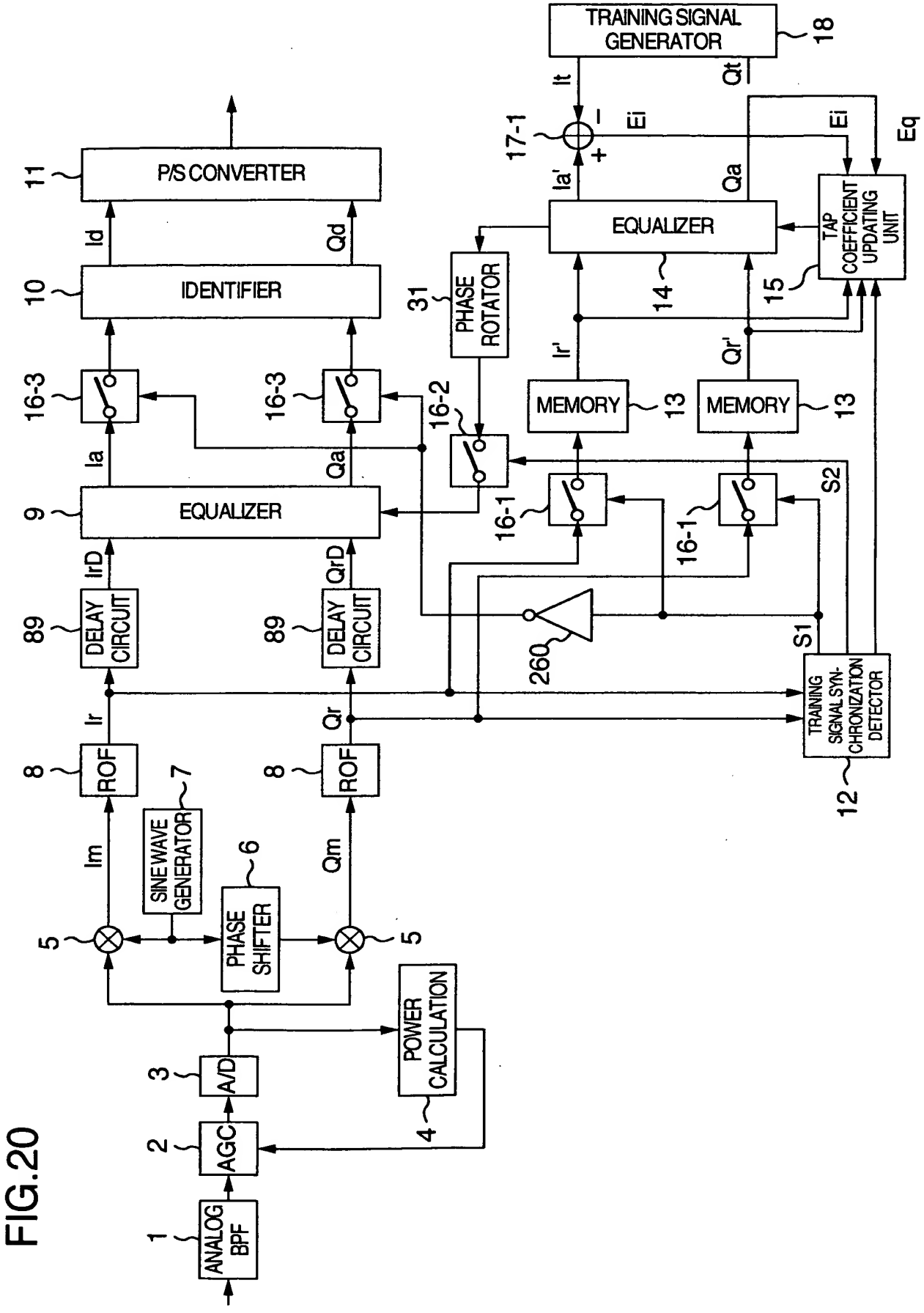
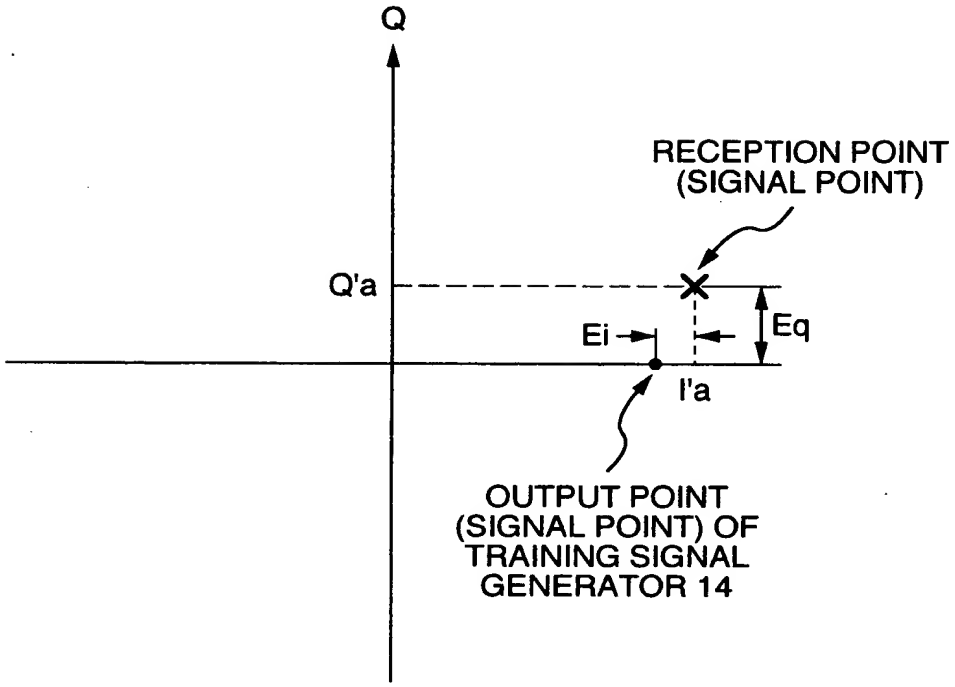

TRAINING SIGNAL GENERATOR
18
It
Qt
17-1
Ei
Eq
Ia'
Qa
EQUALIZER
TAP COEFFICIENT UPDATING UNIT
14
15
P/S CONVERTER
11
Id
Qd
IDENTIFIER
10
31
PHASE ROTATOR
Ir'
Qr'
MEMORY
13
16-3
16-2
16-1
Ia
Qa
9
EQUALIZER
S2
IrD
QrD
89
DELAY CIRCUIT
260
S1
Ir
Qr
TRAINING SIGNAL SYN-CHRONIZATION DETECTOR
12
8
ROF
7
SINEWAVE GENERATOR
6
PHASE SHIFTER
Im
Qm
5
POWER CALCULATION
4
3
A/D
2
AGC
1
ANALOG BPF

FIG.20

FIG.21


Q
RECEPTION POINT
(SIGNAL POINT)
Q'a
Ei
Eq
I'a
OUTPUT POINT
(SIGNAL POINT) OF
TRAINING SIGNAL
GENERATOR 14